

REMARKS

Claims 1-15 are pending in this application.

Claims 1-15 are rejected.

The office action dated 3 December 2003 indicates that claims 1-10 and 12-15 are rejected under 35 USC §102(e) as being anticipated by Nara U.S. Patent Publication No. 2002/0060819, and that claim 11 is rejected under 35 USC §103 as being unpatentable over Nara in view of Ball U.S. Patent No. 6,323,957. The office action also indicates that claims 1-15 are rejected under 35 USC §103 as being unpatentable over Karidi WO 00/70863 in view of Ball. These rejections have been rendered moot by the amendments above to claims 1, 9 and 15.

Amended claim 1 recites a method of processing a digital image corresponding to a scanned document. The method includes analyzing image data to obtain statistical data; deriving background noise removal data for the entire image based on the statistical data; storing the entire image and the background noise removal data, where the stored data available for batch processing; and providing user selection. The user selection allows a user to (a) use the stored image and data to remove background noise from the image prior to rendering the image and (b) bypass background noise removal in the stored image prior to rendering.

This method allows a user to display the document prior to printing. The user can display the document with the background removal and without the background removal. The user can then decide whether to print the document with background removal or the document without background removal.

A particular advantage of this method concerns multi-page documents. Using the method of claim 1, the background removal data is available for each

page. The user can decide whether to perform background removal for each page, after all of the pages have been scanned.

These advantages do not appear to be offered by the documents made of record. Nara does not teach or suggest storing background noise removal data and making the data available for batch processing. Figure 14 of Nara shows a copier 1 including a scanner 2 and a printer 3. The scanner 2 includes a shading unit 43, a background detection unit 46a, a background removal unit 52, and an exposure unit 22. The background detection unit 46a detects the background level (para. 136). The background removal unit 52 removes noise from the background, using the background level as a threshold (paras. 150-151). Paragraphs 98 and 158 suggest that the user has an option of performing or not performing background noise removal prior to rendering. However, the user must make a hard choice. Either the background noise is removed, or it is not removed. Once a new page is scanned in, the data is lost, and the choice can no longer be made. If a user decides to remove background noise at a later time, the page must be rescanned. This is inefficient.

The combination of Karidi and Ball does not teach or suggest the limitations of original claim 1, let alone amended claim 1. Karidi discloses a system for reconstructing a digital image such as a JPEG image. Karidi's system can perform background and dust removal, which can be turned on or off. The office action acknowledges that Karidi does not show any of the other limitations of original claim 1.

Ball describes a method for removing noise in a printed document. The noise is generated by a printer, not a scanner. The printer noise arises from using sparsely scattered dots to print near-white tones. The scanned image can be perfectly clean, (i.e. essentially noiseless), but still near-white tones will be rendered by the printer. Therefore, Ball does not teach or suggest background noise removal in a scanned document, let alone gathering statistical data about a

scanned image, deriving background removal data from the statistical data, and storing the background removal data with the scanned image.

For these reasons, the rejections of amended claim 1 should be withdrawn. Amended claim 1 and its dependent claims 2-8 should be allowable over Nara and the combination of Karidi and Ball.

Claims 2-6 and 14 have been amended to depend properly from claim 1. Claim 3 has been further amended to recite that the background noise removal data can be a tone map function or a sampling of the tonemap function at discrete values. Claim 2 recites that the background removal data and the image can be stored together. Claim 14 has been further amended to recite that the image is color-converted to a luminance-chrominance color space prior to obtaining the statistical data, and wherein the statistical data is obtained from the luminance channel. Claims 7 and 13 have been cancelled.

Claim 15 has been amended to recite a system for processing a digital image corresponding to a scanned document. The system comprises statistical analyzer for analyzing the image to obtain statistical data; function derivator for deriving background removal data for the image based on the statistical data; and data storage for storing the image and the background removal data together. Background removal can be performed on the digital image before and after rendering. Claim 15 should also be allowable over Nara and the combination of Karidi and Ball for the reasons above.

The '102 and '103 rejections of claim 9 have been rendered moot by the amendment above to claim 9. Amended claim 9 recites a method of estimating tone background in a digital image. The method comprises generating edge-metrics for each pixel of the digital image; generating a first luminance histogram of all pixels in the image; using the edge-metrics to generate a second luminance

histogram of pixels near edges; and estimating background luminance from the first and second histograms.

None of the cited documents teach or suggest this method. Nara discloses an analog approach, whereas claim 9 recites a software-based approach. Figure 15 of Nara, for example, discloses that background removal is performed by a smoothing filter 48 followed by a peak/hold (P/H). 49.

Claims 10-12 have been amended to further limit the method of claim 9. These further limitations are not taught or suggested by the documents made of record.

Claims 16-22 have been added. Claim 16 depends from claim 11; claims 17-20 depend from claim 15; and claim 21 is an independent claim. Claim 21 should be allowed for the same reasons that claim 9 should be allowed.

A replacement sheet containing FIGS. 2A and 2B is attached. FIG. 2B has been amended to change the reference numeral for user selection module from "24" to "28."

Paragraph 32 of the specification has been amended to change the reference numeral for user selection module from "24" to "28." Paragraph 43 of the specification has been amended to update the status of U.S. Serial No. 09/704,358. Paragraph 48 has not been amended, since it refers to the same application.

An objection to the declaration is noticed. The examiner is requested to hold the objection in abeyance until allowability of at least one of the claims is indicated.

The examiner is respectfully requested to withdraw the rejections of the claims. If any further issues remain, the examiner is invited to contact the undersigned to discuss those remaining issues.